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GEOGRAPHICAL RECORD

EUROPE

A Population Map of the Sarre Basin and Adjacent Regions. Four papers by Vidal de la Blache and Lucien Gallois in No. 154 of the *Annales de Géographie* (July 15, 1919) comprise a historic and economic study of the Sarre Basin. The fourth paper, "La répartition de la population dans le bassin de la Sarre et les régions environnantes," is accompanied by a colored population density map, reproduced herewith in black and white (Fig. 1). Extension of the area to cover adjacent regions brings out the unity and individuality of the Sarre Basin. On the area thus shown distribution of population is markedly unequal. Such inequality, a relatively recent feature in these lands of old civilization, is the usual resultant of industrial development. Apparently it is to be a law of future population distribution.

On the map three areas of dense population (over 150 to the square kilometer, or about 400 to the square mile) are separated by areas of thinner population, areas in large part occupied by forests, as those of the Hardt and the Hunsrück. Of the areas of dense population that of the Rhine Valley is the most stable, for it rests chiefly on an agricultural basis. The spots of highest density, over 800 to the square mile (over 300 to the square kilometer), are round the commercial centers, Coblenz, Mayence, Worms, Speyer. Ludwigshafen and its environs is the only point of large-scale industry. In the agricultural country it is interesting to note the differences in density coincident with the differences in cultivation. The band of denser population running northward from Weissenburg (Wissembourg) along the hills bordering the Hardt and continuing to Mayence and Bingen is *par excellence* the zone of vine cultivation.

Coal is still the prime factor in industry, and industrial agglomerations are most typically developed on the coalfields. The most compact and dense grouping on the map corresponds with the coalfield of the Sarre Basin (compare the mineral resources map of Alsace-Lorraine, *Geogr. Rev.*, Vol. 6, 1918, opp. p. 112), where the density exceeds 800 to the square mile. This block of high density is surrounded almost completely—except to the south, where it terminates abruptly against the forests of Carlsbrunn and St. Avold—by a zone of population density between 260 and 320 to the square mile (100 to 125 to the square kilometer), also dependent on the coal basin. This transition zone houses workers who come in daily to the mines, the foundries—glass and pottery—and factories by the railroads that thread the valleys.

In some respects the Sarre Basin is industrially unique. There are few such regions where population is so stable and so firmly implanted. An example from statistics lately collected by the French will show this. Out of a group of 3,500 residents, the majority miners or metal workers, 80 per cent were natives of the region and 73 per cent sons of fathers native of the region. In this connection the effects of French exploitation may prove interesting. The Peace Treaty stipulates that "no impediment shall be placed in the way of introduction or employment in the mines and their accessories and subsidiaries of workmen from without the Basin."

It is otherwise with the industrial agglomerations of the Moselle. The grouping here is much less compact and the transition to zones of sparser population more abrupt. The labor includes a very large foreign element, Italian, Flemish, Polish. In the *arrondissement* of Briey foreigners outnumber the native population. The intense industrial growth has been of recent date. It began with exploitation of the Briey mines in 1880 and introduction of the basic process of steel manufacture. Transformation has been too rapid. The consequent maladjustment between man and the soil is something quite foreign to France.

The Influence of Geography on the Conduct of the War. The importance of geography as shown by the war formed the subject of an interesting discussion at a meeting of the Geography Section of the Educational Congress held at Harrisburg, Pa., November 17-22, 1919. Mr. Alfred H. Brooks of the U. S. Geological Survey presented a paper entitled "The Influence of Geography on the Conduct of the War," in which he gave a broad classification of the various factors involved ("Proceedings of Educational Congress, November 17 to 22, 1919," Dept. of Public Instruction, Commonwealth of Pennsylvania, Harrisburg, Pa., 1920, pp. 540-547). Mr. Brooks served as Lieutenant-Colonel of Engineers and Chief Geologist of the American Expeditionary Force. A brief summary of his discussion follows.

The making of war is largely a matter of applied geography. The conduct of war includes (1) military field operations, or the manoeuvering of armies, and (2) the supplying of armies, both of which are to a great extent controlled by geographical factors, such as relief, drainage systems, population, and natural resources. Though the following classification is primarily geographical, an attempt is made to indicate the most important military bearing of the various factors by classifying them under three heads: (1) those influencing general military policy; (2) those influencing the strategy of the campaign, the general plan of operations; (3) those affecting tactics, the details of operation in the face of the enemy.

In determining the general military policy, the prime factors are those of population and natural resources. The significance of the total population needs no comment, while its distribution and density have a very considerable effect. Wide distribution and a lack of homogeneity in the population are decided military handicaps, while a high degree of density of population, if in rear areas, is an evident advantage, though in the immediate theater of war, as in France or Belgium, it hampers defense. The adequacy of the natural resources available for the needs of the population and the fighting forces must also influence policy. The cessation of imports due to the Allies' control of the sea routes put the Central Powers at a great disadvantage because of their lack of several essential minerals and the insufficiency of their agricultural resources.

In all phases of strategy, or the general plan of campaign, the dimensional factor is of prime importance. To give only two of the obvious examples, the width of the zone of operations determines the number of troops necessary, while the length of the line of communication between the front and the supply base is a vital consideration. In this connection it is interesting to compare with our own the length of the line of communication between Germany's front and her source of supplies. However, it is in such physical features as the coast line, relief, and drainage systems that the full significance of the dimensional factor is most apparent.

The length and nature of the coast line, the character of adjacent waters, and the harbors must determine the mode of defense or attack. The long coast line of the Allies was difficult to maintain and, indeed, necessitated naval control. On the other hand, Germany's base on the North Sea, with its adjacent shallow waters and winding approaches, could be held with little effort, while the easily defended entrance of the Baltic (Kattegat) practically rendered it a German sea, thus giving the Central Powers access to the resources of Sweden and Norway. Again, Russia's lack of an open port on her European frontier and the consequent want of contact with her allies was a decisive factor in her military downfall.

The importance of the dimensional factor is again evident in relief, especially in the larger features of relief. The extent of mountain ranges, the symmetry of the ridges, and the character of crest lines, whether continuous or broken by passes feasible for military operations, must control strategy. An excellent illustration of this is afforded by a comparison of the great Alpine chain with the Carpathians, whose length is cut across by many passes, or with the short range of the Vosges, having routes of approach around both sides. An unbroken plateau, such as the central district of the German African colony of Cameroons, is easy to traverse once the summit is attained, while a plateau broken by numerous valleys affords a difficult terrain for military operations. Swampy lowlands greatly hamper the manoeuvering of armies, while naturally well-drained lowlands facilitate troop movements.

An important rôle in strategy is played by the drainage system in the theater of operations, its direction relative to the zone of advance or retreat, the spacing of its streams and the location of its divides. On the eastern front the tide of battle swept back and forth across the principal waterways, and each river offered a locus of resistance and an obstacle to attack, while on the west the German invasion followed up the tributaries of the Rhine. The irregular topography caused by close spacing of watercourses, as in the Argonne of northern France, is admirably adapted to defense, but the more broadly spaced interstream areas, as in northeastern France, permit of the rapid advance of attacking troops. In the highlands a more feasible line of defense is found where the watersheds coincide with the crest lines, as in parts of the Alps, rather than where the upper valleys head back of the mountains. A natural feature of this latter type was utilized by the Rumanian army in its invasion of Hungary, when the Rumanian offensive followed up the gaps in the Transylvanian Alps formed by the valley of the Alt River, whose headwaters lie back of the mountains. The dimensions, the slope of the walls, and the physical character of the valley floors will also evidently exert an influence on military operations, though this influence will be felt more on details of troop movements than on general strategy.

The tactics of modern warfare are largely controlled by physical features. The heavy equipment of modern armies, the use of airplanes and balloons, and the employment of poison gas demand that the details of military operations take into account such governing factors as watercourses, surface formation, climate, and vegetation in the war area. Not only the dimensions, but also the volume and velocity of streams and their rate of fluctuation (varying according to the season of the year) are important because the ease or difficulty of crossing a river with infantry, artillery, and tanks may be a decisive element in a given battle.

The physical conditions of the surface formation controls the movements of heavy artillery and tanks, which can be manoeuvered only on fairly hard ground; and a heavy soil and subsoil, if porous, may become impassable for such troops during a rainy season. Again, the construction of field works, such as trenches, dugouts, and mines, is affected by the condition of the soil and subsoil, as well as by the depth to ground water; and where such conditions are adverse, as in the plains of Flanders and on many of the Russian battlefields, elaborate defensive works are impracticable.

Climate is chiefly important in tactical movements, though the seasonal temperature affects the general plan of campaign, and a similar control is exercised on strategy by extremes of seasonal precipitation. The use of airplanes and of poison gas has made the direction and velocity of wind and the magnitude and frequency of storms important. The airplane and balloon observations of modern war have also rendered significant the distribution of vegetation, whose chief value consists in affording cover for troop movements.

It is difficult to make choice of the geographical factors significant enough to set forth in such a brief presentation, and the limited space makes it impossible to cite examples of the many influences, but the student of the geography of the war, by the use of good maps, can find many applications of the principles here set forth. This note, however, may serve to emphasize the existing relationship between the art of war and the science of geography.

The Meteorological Service of the German Army During the War. Translations of German documents containing accounts of the meteorological work carried on by the German army during the war bring to light many interesting facts not hitherto known (*Monthly Weather Rev.*, Vol. 47, 1919, pp. 871–874). It is evident that special attention was paid to meteorological conditions when gas shells were to be used. The usual decrease in wind velocity during the night led to the use of such shells chiefly in the early morning hours. For the use of gas mines, nights were chosen when the air was not completely calm, but when there was a gentle wind blowing towards the enemy lines. The wind directions in central Europe, arranged according to their frequency, beginning with the least frequent directions, are given as SE, S, E, NE, N, NW, W, SW. The marked prevalence of westerly winds is thus emphasized. "For firing the gas," an official German document says, "it is not always necessary that the wind blow absolutely against the enemy perpendicular to our trenches; a variation as great as 60° from the normal is permissible." The gas being heavier than air, a terrain sloping toward the enemy was more favorable than a flat surface. During a gas attack, observations of wind direction were made continuously and of wind velocity every half hour. A sample report, issued by the army meteorological service, for a position facing the west, is the following:

"You do not need to fear a gas attack today, for we can count on a gentle east wind; on the contrary, it will be possible that during the morning the enemy may make a gas attack, for a complete calm is forecast for that time. This applies especially to the places where the slope rises toward the enemy."

The evidence contained in the translations of these official reports shows very clearly, as was indicated in several of the articles published by the writer of the present note during the war, that the German military meteorological service was a highly efficient organization, which was a very distinct assistance in planning, and in carrying out, military strategy of all kinds.

R. DeC. Ward

ASIA

Climate and Human Efficiency in Korea. Dr. J. D. Van Buskirk of the research department of the Severance Medical College at Seoul, Korea, has for several years been engaged in "a study of the physiology of the Korean people." In this he has paid special attention to diet and climate. The results of his climatic studies appear in the *Transactions of the Korea Branch of the Royal Asiatic Society*, Vol. 10, 1919, No. 15. He begins by giving much the best summary of the Korean climate yet available. Atmospheric pressure is dismissed as of only minor importance so far as the direct effect on man is concerned. Seasons, temperature, humidity, rainfall, storms, winds, sunshine, and clouds, however, are all considered, and valuable tables are given. The most marked characteristics of the climate are the cold, clear, bright winters with considerable variation from day to day, and the warm, rather humid and cloudy summers with little variation from day to day.

Turning to the effect on man, Dr. Van Buskirk finds that so far as mean monthly temperature is concerned there is no great difference in the effect of the climate in Korea and the eastern United States in similar latitudes, that is from Wilmington, Del., to Portsmouth, N. H. But "there is a difference in favor of the United States on account of the humidity and lack of storms and variability in . . . . Korea. It is the feeling of almost everyone when he first arrives in Korea from the United States that the climate is very fine, but before many months have passed we all find it hard to keep up ambition and energy, and it is matter of common knowledge that we do not recuperate so quickly here as in the homeland." Among other troubles neurasthenia is common. "It is not alone this running down of Americans. . . . . the impression gained by even casual observers is that the people of Korea are not . . . . of great vigor. . . . . Many factors would each partially account for this, but . . . . climate is one important factor." The summer conditions of "humidity, lack of the stimulus of changes—lack of 'weather'—and possibly the excess of light" react, or else fail to cause a reaction, "and the very physical tone of the body is reduced." When we compare the people of northern and southern Korea, "there is a difference in favor of the Korean from the northern part. . . . . In this, too, climate forms an important but not the only factor."

Dr. Van Buskirk's study of the Korean climate is an excellent beginning. It will be greatly strengthened when the human side is worked out as carefully and as statistically as the climatic side. Perhaps a correlation of climatic conditions with deaths and hospital cases, together with daily tests of the strength of individuals, would give the desired information. One of the greatest needs today in the field not only of geography, but of medicine, anthropology, sociology, economics, and history is a fuller understanding of the part played by health and energy in determining racial or national character.

Ellsworth Huntington

POLAR REGIONS

On the Sudden Discharge of Icebergs from Greenland's Fiords. To the first number of *Geografiska Annaler*, the new journal of the Swedish Anthropological and Geographical Society, to which reference was made in the preceding number of the *Review* (Vol. 9, p. 368), Morten P. Porsild, the director of the Danish Arctic Station at Godhavn, Greenland, contributes an important article on the so-called "outshooting" of icebergs from the Greenland ice fiords, a phenomenon characterized by a sudden, catastrophic discharge of great volumes of ice from certain fiords (Om de grönlandske Isfjordes saakaldte Udskydning, *Geogr. Annaler*, Vol. 1, 1919, pp. 149–157). The phenomenon has been recorded several times, and the term has become a part of glacial terminology among the Danes and Eskimos, but the process has never been well understood. Herr Porsild after many years' observation and study offers the following explanation:

He divides the ice fiords into types, with gradations between: the Torssukatak type, named from Torssukatak Fiord and characterized by a long-continued, quiescent winter period and a brief summer period, interrupted by a single catastrophic discharge; and the Jakobshavn type, named after Jakobhavn Fiord and characterized by no definite winter or summer period and numerous sudden discharges.

After carefully weighing the evidence he has collected and studying his observations, Herr Porsild concludes that the phenomenon is caused by great masses of water dammed up behind and under the ice, which in times of abnormal melting—as during the prevalence of the Arctic föhn or the summer freshets—accumulates in such abnormal quantities that it finally disrupts the glacier front and forces incredible masses of ice out to sea. He states that every spring he observes a similar phenomenon on a small scale in a little alpine brook that tumbles down the precipitous mountain slopes near his station.

The two types of fiords result from differences in the glacier bed and the basin that it occupies; the number of tributary branches; the capacity of the fiords; the character of the outlets; and the rate of accumulation of the icebergs off the face of the glacier.

Resulting from his firsthand, careful observations, and written in Herr Porsild's clear and illuminating style, the article constitutes a most valuable contribution to the literature of glaciology and geography and merits the attention of every physiographer

W. Elmer Ekblaw

MATHEMATICAL GEOGRAPHY

Quantitative Mapping by Natural Regions. In an article entitled "A New Method of Mapping Complex Geographical Features Illustrated by Some Maps of Georgia" (*School Science and Mathematics*, Vol. 18, 1918, pp. 699–708) Dr. Roland M. Harper describes a method which, when perfected, may prove of much practical value. The gist of the method is to determine for each geographical province the percentage of each of the things to be mapped and then to insert the names in order of their importance with proper indications as to the amount of each. For example, suppose we desire a forest map. Data are collected as to the percentage of trees of each of the main kinds as determined by actual counts such as Dr. Harper has made in each of the natural regions of Georgia, and the names are inserted in each province in the order of their importance. Such a map tells far more about the actual forest than do any of the types of forest maps now available except those on a very large scale, where each individual area can be shown. Or take crops as an example. In the "wire-grass country," which forms a belt running southwest from a point about half way from Augusta to the sea, the crops fall in the order indicated in column 1; while in the next two regions to the southeast, namely the "flat pine lands'" and the "coast strip," the order is as shown in columns 2 and 3 respectively:

(1) *Wire Grass Country*	(2) *Flat Pine Lands*	(3) *Coast Strip*
Cotton	Cotton	Corn
Corn	Corn	Cotton
Sweet Potatoes	Sweet Potatoes	Rice
Peanuts	Sugar cane	Sweet potatoes
Sugar cane	Peanuts	Sugar cane
Vegetables	Oats	
Oats		
Hay		
Cowpeas		

A series of black-and-white maps giving in this way not only the crops, but the percentage of different kinds of soil, trees, manufactured products, and perhaps other things would give a fuller idea of each natural region than do the highly colored and complex economic maps which now are attempted, but which are too confusing for ordinary use. If lines were added in each province showing the relative amount of each of the items named in the map ,the value would be still greater.

ELLSWORTH HUNTINGTON

PHYSICAL GEOGRAPHY

The Climatological Aspect of Radiation. Dr. C. Dorno, on becoming a resident of the high mountains in Switzerland fourteen years ago, "was soon convinced that radiation there presented one of the most important climatic factors," which had been guessed at rather than accurately measured. With a zeal that has raised him to a position of recognized authority on solar and sky radiation he set about measuring "the well-known chief effects of radiation, namely calorific, luminous, chemical, and bactericidal." His results of many years—of wide applicability, but especially in medicine and ethnography, because of their bearing on heliotherapy and human pigmentation—Dr. Dorno has now presented in interesting, non-technical form (On Observations of Solar and Sky Radiations and Their Importance to Climatology and Biology and Also to Geophysics and Astronomy, *Monthly Weather Rev.*, Jan., 1920, pp. 18–24 [translation]).

From the unquestionable physiological importance of solar radiation and the fact "that the differences in absolute amount of radiation and in distribution through the day and the year, from place to place, are far greater and, therefore. more characteristic than those of the other meteorological elements . . . . it might be concluded that for different climatic effects radiation (both incoming and outgoing) is among the most decisive elements." Solar radiation differs widely in its ray elements even at the same place, and for the same solar altitude and apparent clearness of the sky. "The spring sunlight is—at least on the Alpine heights—much richer in heat rays, that of autumn much richer in the ultra-violet ones." We are accustomed to think of sky-light as being a definite, though changing, percentage of direct sunlight: on the contrary the relation is by no means simple. "With middle sun elevations and cloudless sky the red light of the sun falling on the horizontal surface is found to be 14 times stronger than that from the sky, while its brightness is only 11 times stronger, its chemical rays only 4.4 times, its pure ultra-violet (bactericidal) rays even less strong than those of the sky (only about half so powerful)." Evidently, when we speak of "sunlight" we are using a broad generalization. CHARLES F. BROOKS

HUMAN GEOGRAPHY

Wind Maps for Aviators. Mention of new developments in plotting the direction and force of air currents recalls the work so successfully initiated by Lieutenant M. F. Maury in 1847. The publication, in that year, of his "wind charts" ushered in a new era of navigation, since prior to that date mariners had been unguided in the selection of their routes save by tradition and their individual experience. Following Maury's lead, Brault, Buys Ballott, Fitz Roy, and others perfected the undertaking, until now the surface winds over the ocean are mapped in detail on the "pilot charts" of the leading maritime nations. With the advent of aërial navigation it becomes necessary to extend that work so as to cover not only the ocean but the land, and to map the course and velocity of winds at varying altitudes as well as surface currents. Data for the use of aviators had already been collected in several European countries before the war brought aviation to its present development (see note in the *Bull. Amer. Geogr. Soc.*, Vol. 42, p. 530), and in America Professor A. Lawrence Rotch (in collaboration with Andrew H. Palmer) had published his "Charts of the Atmosphere for Aeronauts and Aviators" (New York, 1911). But such studies either covered small areas or were very much generalized. Rapid progress was made during the war, and recently some of the wind maps prepared have been published (see "Les cartes des vents à l'usage des aéronautes" by J. Rouch, Chef du Service Météorologique de la Marine, and L. Gain, *Rev. Gén. des Sci.*, March 30, 1919, pp. 168–171). Three maps of the western Mediterranean are reproduced in this article, one showing surface air currents, another those at 1000 meters, and the third those at 2000 meters altitude. Wind roses, showing the frequency of principal winds and their force according to the Beaufort scale, are given on each map for ten different stations about the coasts. The value of such maps is patent. They will be of even greater service to aviators than are the pilot charts to sea navigators, since the former enjoy greater latitude in the choice of routes and are able to make detours either horizontally or vertically in the ocean of air in order to obtain the most favorable or least contrary winds. The maps show clearly that an aviator traveling between two points may find it advantageous to go at one elevation and return at another, either because he finds the air currents at different levels moving in opposite directions or because they blow with different velocity at varying altitudes. For example, the journey from Oran to Tunis should be made at about 2000 meters elevation, thus gaining the assistance of a strong westerly wind, while the return should be made at an altitude of less than 1000 meters, where the westerly blows with greatly diminished force. Similar conditions are found in most localities, emphasized where topography exerts a marked influence on surface currents or where the passage of cyclonic disturbances interrupts temporarily the general circulation of the atmosphere. Seasonal variations in the movement of air currents are so pronounced and the aviator's dependence upon these currents so great, in order that he may travel with least expenditure of time and power, that wind charts will have to be issued frequently, perhaps more frequently than the monthly issues of the pilot charts.

For the construction of these wind maps the organized co-operation of aviators will be required, since each chart entails the correlation of very numerous data. The wind chart which forms Plate I in Maury's "Physical Geography of the Sea" (New York, 1855, p. 70) is said to have been the product of 1,159,353 separate observations on the force and direction of the wind and of more than 100,000 observations on the height of barometer at sea. The collection of data sufficient for satisfactory charts of winds at different altitudes will be possible only with the assistance of a great number of observers, organized under some such arrangement as that effected by Maury or by the British Admiralty which in 1850 made it obligatory for masters of ships to keep a uniform log and report the results of their observations to the Hydrographic Office.